

WHAT IS GEOSCIENCE?

Geoscientists study the Earth's systems — the complex geologic, marine, atmospheric, and hydrologic processes that sustain life and the economy. Geoscience expertise enables us to develop solutions to critical economic, environmental, health, and safety challenges.



Satellite image: NASA/USGS Landsat Program. State outline: Matt Battison.

WORKFORCE IN ARIZONA

- 6,600: **geoscience employees** (non-federal/self-employed) in 2015¹
- \$70,100: average median geoscience employee salary¹
- 12,400: **jobs** in extractive industries in 2015²
- 5: academic geoscience departments³

WATER IN ARIZONA

- 2.6 billion gallons/day: total groundwater withdrawal⁴
- 3.5 billion gallons/day: total surface water withdrawal⁴
- 1.2 billion gallons/day: public supply water withdrawal⁴
- 4.6 billion gallons/day: water withdrawal for irrigation⁴
- 13 million gallons/day: self-supplied industrial fresh water withdrawal⁴
- 97% of the population is served by public water supplies⁴
- 12 counties in 2015, and 6 counties in 2016, designated as primary natural disaster areas caused by drought⁵
- 77 USGS stream gages in **Arizona**⁶

¹ Data Derived from Bureau of Labor Statistics Occupational Employment Statistics (2015)

² U.S. DOI Extractive Industries Transparency Initiative

³ American Geosciences Institute Directory of Geoscience Departments (2016)

⁴ USGS Estimated Use of Water in the United States in 2010

⁵ USDA Farm Service Agency Disaster Designation Information (2015 Crop Year & 2016 Crop Year)

⁶ USGS WaterWatch Total Streamgage Stations (March 10, 2017)

By the numbers: ARIZONA

- \$5.56 billion: value of nonfuel mineral production in 2016⁷
- 6,600: **geoscience employees** (non-federal/self-employed)¹
- 12,400: **jobs** in extractive industries in 2015²
- 13 flooding disaster declarations since 1953⁸
- \$256 million: NSF grants awarded in Arizona in 2016¹⁸
- \$8.5 million: NSF GEO grants awarded in Arizona in 2016¹⁸

ENERGY AND MINERALS PRODUCTION IN ARIZONA

- \$5.6 billion: value of nonfuel mineral production in 2016⁷
- 106 million cubic feet: natural gas produced in 2014²
- 8.1 million short tons: coal produced in 2014²
- 468,000 megawatt hours: wind power produced in 2015²
- 6.5 million megawatt hours: hydroelectricity produced in 2015²
- 3.5 million megawatt hours: solar power produced in 2015, #2 in the nation²

NATURAL HAZARDS IN ARIZONA

FEMA statistics for Arizona

- 10 severe storm disaster declarations since 1953⁸
- 1 hurricane/tropical storm disaster declarations since 1953⁸
- 13 flooding disaster declarations since 1953⁸
- 36 fire disaster declarations since 1953⁸
- \$23 million: mitigation grants since 2005⁸
- \$474 million: preparedness grants since 2005⁸
- \$52 million: public assistance grants since 2005⁸
- 20 weather and/or climate events, each with costs exceeding \$1 billion (inflation adjusted) 1980-2016⁹

⁷ USGS Mineral Commodity Summaries (2017)

⁸ FEMA Summary of Disaster Declarations and Grants (2016)

⁹ NOAA Billion-Dollar Weather and Climate Disasters: Mapping

AGI is a network of 51 member societies, representing more than 250,000 geoscientists.

Written and compiled by Jeremiah Bernau for AGI, April 2017. This work may be distributed under a Creative Commons BY-NC-ND 4.0 license.

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U.S. GEOLOGICAL SURVEY (USGS) GEOLOGIC MAPPING

- \$1.06 billion: total FY 2016 USGS budget; 1.6% up from FY 2015¹⁰
- The USGS National Cooperative Geologic Mapping Program (NCGMP) funds geologic mapping projects by states (STATEMAP) and universities (EDMAP)
- \$4.1 million: **Arizona** STATEMAP funding (1993-2016)¹¹
- Over 100 geologic maps covering 7,000 square miles in **Arizona** created through STATEMAP (1993-2014)¹¹
- University of Arizona, Arizona State University, and Northern Arizona University participated in EDMAP¹¹

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

- \$5.6 billion: total FY 2016 NASA Science budget; 6.6% up from FY 2015¹²
- \$1.9 billion: total FY 2016 NASA Earth Science budget; 7.7% up from FY 2015¹³
- GRACE satellites measure groundwater changes in all of **Arizona**¹⁴
- SMAP satellite measures soil moisture in all of **Arizona**¹⁴

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

- \$5.8 billion: total FY 2016 NOAA budget; 5.9% up from FY 2015¹⁵
- GOES satellites provide state-of-the-art weather forecasting over **Arizona**¹⁶
- DISCOVER satellite monitors radiation and air quality over **Arizona**¹⁶
- 18 National Weather Service Automated Surface Observing Systems (ASOS) stations in **Arizona**¹⁷
- 170 National Weather Service Cooperative Observer Program (COOP) sites in **Arizona**¹⁷

¹⁰ DOI Budget and Performance

¹¹ USGS National Cooperative Geologic Mapping Program

¹² NASA Budget Documents, Strategic Plans and Performance Reports

¹³ American Institute of Physics FY2016 Appropriations

¹⁴ Gravity Recovery and Climate Experiment (GRACE); Soil Moisture Active Passive (SMAP)

¹⁵ NOAA Total Budget

¹⁶ Geostationary Operational Environmental Satellite (GOES) & Deep Space Climate Observatory (DISCOVER)

¹⁷ NOAA in Your State

NATIONAL SCIENCE FOUNDATION (NSF)

- \$7.46 billion: total FY 2016 NSF budget; 1.6% up from FY 2015¹⁸
- \$1.28 billion: total FY 2016 NSF Geosciences Directorate (GEO) awards; 1.6% up from FY 2015¹⁸
- 436 NSF grants in **Arizona** totaling \$256 million in 2016¹⁸
- 49 NSF GEO grants in **Arizona** totaling \$8.5 million in 2016¹⁸
- \$5 million: NSF GEO grants to **University of Arizona** in 2016¹⁸
- \$2.1 million: NSF GEO grants to **Arizona State University** in 2016¹⁸

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

- \$8.14 billion: total FY 2016 EPA budget; 0% up from FY 2015¹⁹
- 14 active/proposed superfund sites²⁰
- \$362 million: federal grants for Drinking Water State Revolving Fund (DWSRF) in **Arizona** (1997-2016)²¹
- \$15 million: annual value of federal DWSRF grants in **Arizona** in 2016²¹

MAJOR FEDERAL FACILITIES IN ARIZONA

- USGS **Arizona** Water Science Center, Tucson
- USGS Astrogeology Science Center, Flagstaff
- USGS Flagstaff Library
- USGS Southwest Climate Science Center, Tucson
- NSF National Optical Astronomy Observatory, Tucson

YOUR STATE SOURCE FOR GEOSCIENCE INFORMATION

Arizona Geological Survey

1955 East Sixth Street

PO Box 210184

Tucson, AZ 85721

<http://www.azgs.gov>

(520) 621-2470

¹⁸ NSF Budget Internet Information System

¹⁹ EPA Budget and Spending

²⁰ EPA Search for Superfund Sites Where You Live (March 2017)

²¹ EPA Drinking Water State Revolving Fund National Information Management System Reports

AGI's Geoscience Policy and Critical Issues programs support well-informed public policy and decision making by providing information and facilitating dialogue between the geoscience community and decision makers at all levels.

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